PUBLIC HEALTH

# The weak connection between venous thromboembolism and air travel

***Epidemiology:*** The association between air travel and the risk of venous thromboembolism (VTE) is widely publicized and suspected, the theory being that venous stasis caused by prolonged sitting in a cramped airplane increases the risk of VTE. Since Virchow established his classical triad of endothelial lesion, venous stasis and hypercoaguability in 1856, several risk factors related to the development of VTE have emerged: family history of VTE, pregnancy and the puerperium, malignant disease, hormone therapy, age, history of trauma and an array of inherited blood disorders.[1] During an era when millions of people embark on long flights throughout the world every year, should a recent history of air travel be added to this list as an independent risk factor for VTE in the general population?

Extrapolation from laboratory evidence renders this association plausible. A person's venous flow velocity is two-thirds lower when sitting than when lying down,[2] and compression of the popliteal vein on the edge of the seat could contribute to venous stasis. Cabin-related conditions such as low air pressure and relative hypoxia appear to decrease fibrinolytic activity[3] and increase markers of activated coagulation.[4] Healthy people exposed to an 8-hour simulated flight at an altitude of about 2400 m with 10% humidity had increased mean plasma and urine osmolality, indicating dehydration.[5] These conditions may contribute to the development of VTE.

Yet the epidemiologic data, most of which are derived from retrospective cases reports, are less convincing and suggest that, despite media alerts, VTE following air travel is a rare event carrying minimal absolute risk. In one study, every patient with VTE treated in 5 hospitals serving a relatively fixed population of 650 000 people in northeast England over a 12-month period was asked about travel in the 4 weeks before diagnosis. Twenty-six patients (4.1%) were identified from among the 634 patients in whom a VTE developed, giving an annual incidence of travel-related VTE of 0.4 per 10 000 in this population.[6] This estimate is similar to the risk of VTE in a young adult in the general northern European population (1 per 10 000).[1] The finding has led some scientists to speculate whether the association between VTE and air travel is mere circumstance.[7,8]

In a small case–control study comparing the travel history of 160 patients in hospital because of VTE and the travel history of 160 control patients admitted to a cardiology unit, the VTE-related odds ratio was 3.98 (95% confidence interval 1.9–8.4) among patients who had travelled within 4 weeks before admission.[9] Twenty-nine (75%) of the 39 VTE patients with a history of recent travel had no secondary cause and were deemed to have idiopathic VTE, as compared with 46 (38%) of the 121 patients without a history of recent travel. However, studies of this design may be limited by recall bias and the selective choice of control groups, both of which may overestimate the risk associated with travel. Controlled prospective studies are required to identify the incidence of this condition and those at risk. The current available evidence indicates that the association between symptomatic VTE and air travel is weak and its incidence much less than that implied by the recent publicity surrounding the case of a 27-year-old woman who died of pulmonary embolism after disembarking from a flight from Australia to London.

***Clinical management:*** The spectrum of symptoms for VTE range from tenderness or swelling in the calf to phlegmasia cerulea dolens. The leg thrombosis may be asymptomatic, so that the first symptoms may be chest pain, dyspnea or atrial fibrillation after the pulmonary embolism has occurred. The standard examination of a leg thrombosis is a colour duplex Doppler scan, followed by ascending venography if the scan result is equivocal. The diagnosis of pulmonary embolism is based on a combination of clinical signs and ventilation-perfusion lung scan, pulmonary angiography or pulmonary CT angiography.[10] Prolonged antithrombotic therapy with heparin and warfarin is the mainstay of treatment.

***Prevention:*** Until better evidence is available, there is no firm foundation for preventive advice. For patients with no risk factors, the general recommendations — drink plenty of water, stretch frequently and change position — can do no harm. Patients with risk factors may be advised to wear compression stockings or to take ASA or low-molecular-weight heparin, depending on their level of perceived risk.[1,7] — *Erica Weir*, CMAJ

## References

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